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THE OWENS COLLEGE

The Owens College: its Foundation and Growth, and its Connection with the Victoria University, Manchester. By Joseph Thompson. (Manchester: J. E. Cornish, 1886.)

THE future historian of the progress of education in England during the nineteenth century will regard the foundation of the Owens College, Manchester, as an event of the first importance. The idea of establishing, in the midst of our great manufacturing towns, institutions devoted to the higher learning was not new. The experiment had been tried in various forms in Manchester itself, but had always failed. A College of Arts and Sciences was founded in 1783 by some of the leading men in the town and county, but, owing to "a superstitious fear of a tendency of a taste for knowledge to unfit young men for ordinary business, this excellent institution had not a long existence." In 1836 meetings were held, and a scheme was drawn up for the establishment in Manchester of a College for general education. In the spring of 1837 it was proposed to elect a Medical Faculty in connection with the College; but, before another year passed, the scheme was abandoned, as very few pupils came forward.

Institutions which aimed chiefly at the preparation of candidates for the Nonconformist ministry were more successful. The Manchester Academy, and the Lancashire Independent College, founded in 1786 and 1840 respectively, are active now; but while the latter is in close alliance with the Owens College, the former has migrated to London. It was not the desire of business men for culture or for technical education, but a demand on the part of Nonconformist professional men for a training which the tests imposed by the older Universities debarred them from obtaining there, which enabled these institutions to survive when others failed. Nay, more; the strongest argument which George Faulkner brought to bear on his friend John Owens, to persuade him to alter the will by which he had made him his heir and to found a College, was "that as he had such strong prejudices against the tests imposed at the older English Universities, he could enable young men to obtain an education equal to that of the favoured institutions, without these hindrances."

But, whether or no Owens was influenced mainly by a feeling of indignation at an injustice which has now been long removed, his benefaction has produced results even wider than those which have followed the abolition of the tests he disapproved. The Owens College was the first example of the successful establishment in a manufacturing town of an institution which gave to all comers a University education. When Manchester had proved that success was possible, others were not slow to follow where she had led. The Owens College was opened in 1851. For some years it seemed that it was to share the fate of its predecessors. At length the tide turned, and the passing of the Owens Extension College Act in 1870 marked the attainment of assured success. In that year Newcastle established a College of Physical Science, the Yorkshire College was founded in Leeds in 1874, and now no large town considers its educational equipment complete if it cannot point to a "University College" in its midst. The importance of this result can hardly be exaggerated. In the midst of a great democratic movement, it has been practically proved that culture and learning need not be the exclusive property of the few. The provincial Colleges have made it possible for the young artisan to obtain instruction from, and to test his own abilities by contact with, teachers who are masters of the subjects they profess. The Owens College is, no doubt, as far as its day classes are concerned, a middle-class institution. But its authorities have also developed a system of evening lectures, by means of which many a working-man has made his first step upwards from the ranks.

At first, the Council and Staff of the College had to face the difficulties which beset pioneers. The religious difficulty met them at the outset. An early attempt at amalgamation with the Medical School failed. The Professors one and all complained that, through lack of a sound elementary training, their students were unable to profit by the instruction they gave. "The worst that can be said of [the College]," remarked the *Manchester Examiner* of July 20, 1858, "is that it is too good for us. It is out of place here, just as a missionary may be said to be out of his place on the coast of Africa. He offers the Gospel, and the people want Sheffield blades. . . . The crowd rolls along Deansgate, heedless of the proximity of Plato and Aristotle. . . . And where is poor learning all the while? Going through its diurnal martyrdom of bootless enthusiasm and empty benches."

The men who had the fate of the College in their hands were not, however, daunted by cold comfort such as this. Gaps in the Staff were promptly filled up. Principal Scott resigning on account of ill health, his place was filled by Prof. Greenwood, and Mr. Roscoe was selected to fill the vacant Chair of Chemistry. Nor was this confidence misplaced. Almost contemporaneously with these appointments, the dwindling number of students began to increase, and within some half-dozen years the difficulty of preventing failure was followed by the difficulties of providing for success. In 1864 we hear of the "insufficient or unsuitable accommodation furnished by the College buildings." In 1865 Prof. Clifton reported that the percentage of carbonic acid in the air of his lecture-room at the conclusion of a lecture was more than four times the maximum consistent with health. Students of the biological sciences complained of the difficulty of finding admission to well-arranged and complete collections of natural history.

It would take too long to follow step by step the advance of the College, but in reading Mr. Thompson's full account of the way in which each difficulty was overcome, the reader cannot but be struck with the fact that the work of the Council and Staff was essentially that of pioneers. Everything had to be discussed; nothing was determined by precedent. In 1860 it was decided that a Professorship of Physics should be founded, but before this step was taken it was thought necessary to inquire not only whether the students were numerous enough and the College rich enough to warrant the change, but whether a Professorship of Physics was in itself a desirable thing. Professors De Morgan and Stokes were asked for formal written opinions on this knotty point. The new Chair was only established when it was held to have been proved that the field of mathematics and natural philosophy was wide enough for the employment of two labourers in different parts. There can be no doubt that the College was remarkably fortunate in the members both of its Council and of its Senate. The Neilds—father and son Mr. Ashton, Mr. Oliver Heywood, and many others, worked as though their personal interests were all bound up in the success of John Owens' bequest. They succeeded in filling the Chairs with men of the most brilliant abilities. To mention only some of those whose connection with the College has now ceased, it is evident that an institution which has within a few years commanded the services of men like Sir Henry Roscoe and Professors Frankland, Clifton, Jevons, Jack, and Gamgee, must have deserved the success it has won.

Nor is it uninstructive, regarding the Owens College as the pioneer in a great movement, to observe how largely that movement has been and is being directed by men who themselves owe much to the Manchester institution. By glancing only at the list of those who have held the office of demonstrator in the physical or chemical laboratories, or of lecturer on mathematics, we observe that the Professorships of Physics in the Mason College, Birmingham; of Chemistry in Anderson's College, Glasgow, the Yorkshire College, Leeds, the College of Physical Science at Newcastle-upon-Tyne, and the Firth College, Sheffield; and the Professorships both of Chemistry and Physics in the Normal School of Science, South Kensington, and in University College, Dundee, are or have been held by *alumni* of the Owens College.

When once the College began to grow, it grew rapidly. The change wrought in fifteen years was remarkable. Besides the establishment of numerous new professorships, the Manchester Natural History and Geological Societies handed over their collections to the College as the recognised centre of scientific learning in Manchester. The College and the Medical School were fused into one institution. The handsome buildings in Oxford Road were erected upon land, and partly also with funds, furnished by an Extension Committee, which numbered among its members many of the best-known men in the town, and of which Dr. Watts, whose death Manchester has recently had to deplore, was secretary.

When this was accomplished, the College proceeded to claim the status and powers, as it had already proved its capacity for doing the work, of a University. This question affected interests other than those of Manchester itself. The Yorkshire College, Leeds, then very recently founded, and immature, had sufficient faith in its own future to claim a share in determining the conditions on which a new University was to be established in the North of England. This claim was at first enforced by a formal opposition to the Owens College scheme, on certain specified grounds. Whether a Leeds historian would agree with Mr. Thompson that the opposition "was not based upon accurate knowledge" may be open to question. It may be that the mistake was on the other side, and that the Owens College authorities had not as yet fully recognised the magnitude of the movement to which they themselves had given so great an impulse. However this may be, the controversy seems to have been conducted with fairness and good temper, and to have resulted in an agreement which left none but kindly feelings behind. The Council of the Owens College received satisfactory assurances that their Leeds friends did not desire to share the advantages to be conferred by the Charter of the University till they had made their College worthy of representing it in Yorkshire. On the other hand, they conceded the demand of Yorkshire that the name of the University should not be that "of a town or of any person whose claims to such distinction are merely local." A compromise was arrived at on the other point to which importance was attached. Leeds desired that the Governing Body of the University should be separate and distinct from that of the Owens College, and that it should have power "to incorporate the Owens College and such other institutions as may now or hereafter be able to fulfil the conditions of incorporation laid down in the Charter." This condition was agreed to, with the modification that the Owens College should be named in the Charter as the first College of the University, and that thus its incorporation should be simultaneous with and not posterior to the foundation of the University itself. Finally, a joint deputation from Lancashire and Yorkshire petitioned the Crown in favour of the establishment of the new University. The Charter was granted in 1880. The Owens College was constituted the first College of the University, and though the Yorkshire College has not yet joined it, University College, Liverpool, has recently been admitted as the second member of the federation.

Mr. Thompson's work appropriately ends with the flattering tribute paid by his fellow-citizens to Sir Henry Roscoe by his election as Member of Parliament for one of the divisions of Manchester, and with the expression of the regret of the Council at the severance of his connection with the College. The success of the Owens College is due to no one man, but to no one man more than to Sir Henry Roscoe. His withdrawal may fitly mark the termination of the period of struggle with initial difficulties. The main work of organisation is over. The chief outlines of the scheme for bringing industry into contact with culture and with technical education are drawn. It remains for the Owens and her sister Colleges to fulfil the task on which they are now fairly embarked.

We believe it is not unlikely that in carrying on their work the authorities of the Victoria University may find it necessary to appeal to the Government for a contribution towards the University funds. It will of course be easy to say that as Manchester and Liverpool have done so much they may be left unaided to do more. In forming an opinion upon this question it will be well for the public to remember that, whereas the Universities or Colleges in Edinburgh, Glasgow, Aberdeen, St. Andrews, Aberystwith, Bangor, Cardiff, and the Queen's Colleges in Ireland, receive subventions from the State which amount in all to between 40,000*l.* and 50,000*l.* per annum, English higher education in provincial towns has been entirely provided by unselfish private enterprise, with some assistance in Newcastle from the University of Durham, and elsewhere from the Clothworkers' Company and others of the City Guilds. As far as help from Parliament is concerned, England as usual has to find its share of the money and reaps none of the advantage. It is surely not too much to hope that, if 8000*l.* a year is allotted from the public funds to Colleges which supply the wants of Aberystwith and Bangor, it will not be considered impolitic to help from the National Exchequer the magnificent and national work which has been and is being done in the North of England.

But to return to the book before us. It is fortunate that while the memory of the men who initiated the undertaking is still fresh, and while most of those who carried it out are still with us, an historian such as Mr. Thompson has been found for the Owens College. He has given, not merely the public story of the institution, but short histories of many of those who were closely connected with it and who have now passed away. He has evidently had access to authentic documents and other sources of accurate information, and he has produced a work which will be read with interest by many who have in the past known but little of the Owens College and its founders.

ANDERSON ON HEAT AND WORK

On the Conversion of Heat into Work. By W. Anderson, M.Inst.C.E. (London: Whittaker and Co., and George Bell and Sons, 1887.)

VERY few modern books on Engineering contain what can truly be called accurate science; one of whose special characteristics is the use of each term *in one definite sense only.* In other words, take at random a work on any branch of Engineering, and you find, in every page, more than one sentence which, if it be read as a scientific statement, is simply inaccurate. Of the exceptional works the majority consist of those written by the late Prof. Rankine. He seems to have left no successor, so far as this department of applied science is concerned; and the book before us strongly supports the notion. It gives, in a succinct but comprehensive form, an introduction to the modern Dynamical Theory of Heat, treated almost entirely from the practical Engineer's point of view. It is obviously written by a man who knows his subject, and it is therefore presumably written in terms intelligible to those for whom it is designed. It thus affords a good opportunity of making some further remarks upon the strange line of separation which has unfortunately been drawn between the vocabularies (or, rather, the dictionaries) of Pure and of Applied Science. In using this opportunity, for the purpose stated, we do not attack the present work in particular; we attack the mass of works on Engineering, of which it is a high-class specimen.

From the purely scientific point of view there are two prominent faults in the majority of such works as that before us. The first is the habitual use of a special "vernacular"; not so outrageous, perhaps, as "pidgin" English, but quite on a par with a "wire," a "cable," an "aniline," and such-like monstrosities of recent American origin. Were the words of this vernacular different from those of strict science, our only complaint against their use would be that we should have to learn what would be practically a new language before we could read an Engineering book. But they are, in the main, the same words; and yet each stands for other than the usually accepted meaning. Thus we constantly find pressure given as so many tons per square inch (sometimes the word "square" is omitted). Now, tons per square inch, or pounds per square foot, refer to matter and not to force. They measure, in fact, what is called surface-density. This is altogether "most tolerable, and not to be endured."

The second fault is more grave. It consists in the fundamental misuse of well-settled scientific terms, which the author of an Engineering book usually perpetrates whenever (for a moment) he deserts his vernacular and passes from the applied to the pure part of his subject. We remark in passing that, in the very first page, our author speaks of Mayer's EXPERIMENTAL demonstration of the equivalence of heat and work! This shows how deep a root has been taken by the extravagant laudations of Mayer, which were so common twenty years ago, but which have long since been thoroughly exploded.

Now, to faults of the first class mentioned above. We quote only a few of the more racy passages we had marked; and here, as in the subsequent examples, we introduce (to save comment) Italics where they seem desirable.

"Accelerating forces, *that is* forces acting steadily for a time." This may be the Engineer's vernacular, but it has no necessary connection with the use, in English, of the term "accelerating force."

"Dividing (3,942,400 *foot-pounds* per minute) by 33,000 *foot-pounds*, we get 119·4 *horse-power!*" Put this in the form "dividing 500*l.* a year by 50*l.* we get 10*l.* a year," which contains essentially the same absurdity, and we can scarcely fancy that our author would have let it stand; although in its above form it is put as Engineers too commonly put it.

"The heavenly bodies, *moving at uniform velocities for ever* are instances of *potential* energy." This is the Engineer's way of saying that since there is no change of kinetic, there can be no change of potential, energy.

"When we speak of perfectly elastic substances, we do not mean those which, like india-rubber, have a great range of elasticity." But, though this is true of Engineers, it is not true of purely scientific men. Think of air, for instance.

"Endowed with energy competent to produce the *sensation* of 100° Fahr. of *heat.*" Here the Engineers pick a quarrel with the Physiologist as well as with the Physicist.

As explained above, all this is merely the licence which practical men take with scientific terms. As the book is written for such men, perhaps we ought not to complain. But the faults of the second class, some of which we proceed to give, can only be explained by the practical men's using scientific words in a wrong sense. From the following, and others too numerous to be quoted, a new science (!) could be founded, having nothing in common with that which Galilei and Newton have handed down to us, (of course on the supposition that all the words employed are to be taken as they are understood in pure science.)

"Hence the *potential energy* of each gallon of water is